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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,994	09/06/2002	Reza Taherian	20.282	1845

23718 7590 09/10/2003

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EXAMINER
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VARGAS, DIXOMARA

ART UNIT	PAPER NUMBER
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2859

DATE MAILED: 09/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/064,994

Applicant(s)

TAHERIAN ET AL.

Examiner

Dixomara Vargas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 September 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2-4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: #100, #102, #104, #106, #108, #110, #200, #202, #204, #302, #304, #A, #402, #414, #600, #602 and #800. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Objections***

4. Claim 1 is objected to because of the following informalities: The recitation "adapted to" is not clear since it has been held that the recitation that an element is "adapted to perform a function is not positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-51 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. The terms "less than" in claims 1 and 26 is a relative term which renders the claim indefinite. The terms "less than" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-8, 10-18, 24-33, 35-43, 49-62 are rejected under 35 U.S.C. 102(b) as being anticipated by Heaton et al. (US 6,255,818).

With respect to claims 1, 26 and 52, Heaton discloses an NMR measurement apparatus, comprising (Abstract): a permanent magnet (Figures 2-6, 9-15; #54, #154, #182 and #202); a primary coil extending across a first surface area, the primary coil having an associated depth of investigation and an associated vertical resolution and producing a primary RF field in a volume

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of earth formation, a secondary coil extending across a second surface area, the second surface area less than the first surface area, the secondary coil having an associated depth of investigation and an associated vertical resolution and producing a secondary RF field in a volume of earth formation (Figures 2-6, #52; Column 8, lines 28-48); a circuit coupled to the primary coil and the secondary coil adapted to perform high resolution NMR measurements of an earth formation (Columns 5 and 10, lines 41-45 and 1-8 respectively; Figures 2-6, #51).

10. With respect to claims 2 and 27, Heaton discloses a secondary coil dataset associated with NMR measurements made for a depth of investigation associated with the secondary coil (Columns 8-9, lines 62-67 and 1-26 respectively; Figures 2-6).

11. With respect to claims 3 and 28, Heaton discloses a high-resolution log is generated based on the secondary coil dataset (Figure 1).

12. With respect to claims 4 and 29, Heaton discloses a primary coil dataset associated with NMR measurements made for a depth of investigation associated with the primary coil (Columns 8-9, lines 62-67 and 1-26 respectively; Figures 2-6).

13. With respect to claims 5 and 30, Heaton discloses a spin-spin relaxation estimate based on a combination of the primary coil dataset and the secondary coil dataset (Column 6, lines 3-14).

14. With respect to claims 6 and 31, Heaton discloses the depth of investigation of the secondary coil is shallower than a depth of investigation of the primary coil (Figures 2-6).

15. With respect to claims 7 and 32, Heaton discloses the depth of investigation of the secondary coil is substantially the same depth as the depth of investigation of the primary coil (Figures 2-6).

16. With respect to claims 8 and 33, Heaton discloses the apparatus is a centralized-type logging tool (Figures 2-6, 9-15).

17. With respect to claims 10 and 35, Heaton discloses a size of the secondary coil is optimized based on a combination of the depth of investigation of the secondary coil and the primary coil and the vertical resolution of the secondary coil and the primary coil (Column 10, lines 1-38).

18. With respect to claims 11 and 36, Heaton discloses the NMR measurements are made while drilling a borehole (Column 10, lines 50-55).

19. With respect to claims 12 and 37, Heaton discloses the primary coil and the secondary coil are arranged in a non-overlapping configuration along the axis of the apparatus (Column 8, lines 28-30; Figures 2-6).

20. With respect to claims 13 and 38, Heaton discloses the secondary antenna is located near a proximate end of the main antenna measured along the longitudinal axis of the NMR measurement apparatus (Figures 2-6).

21. With respect to claims 14 and 39, Heaton discloses the secondary coil is located a distance from the primary coil that minimizes an electrical coupling between the secondary coil and the primary coil (Column 10, lines 1-49; Figures 2-6).

22. With respect to claims 15, 40 and 55, Heaton discloses the second coil is operated in an active mode as both a transmitter and a receiver (Column 5, lines 28-62).

23. With respect to claims 16, 41 and 56, Heaton discloses the secondary antenna selectably transmits a portion of an NMR acquisition sequence (Column 5, lines 28-62).

24. With respect to claims 17, 42 and 57, Heaton discloses the primary coil is selectably operated in either a passive or active mode (Column 5, lines 28-62).

25. With respect to claims 18 and 43, Heaton discloses at least a portion of the first surface area overlaps the second surface area (Figures 5-6).

26. With respect to claims 24 and 49, Heaton discloses the secondary coil further comprising: an array of secondary coils arranged in a non-overlapping configuration along the axis of the apparatus (Figures 2-6, #52i)

27. With respect to claims 25, 50 and 60, Heaton discloses the array of the secondary coils comprises a pair of secondary coils, each of the pair of secondary coils situated at opposite proximate ends of the primary coil measured along the longitudinal axis of the NMR apparatus (Figures 2-6, #52i).

28. With respect to claims 51, 53, 58 and 62, Heaton discloses a first plurality of secondary coils having a radiation polarization orthogonal to a radiation polarization of the primary coil; and a second plurality of secondary coils having a radiation polarization parallel to the radiation polarization of the primary coil, wherein the secondary coils of the first plurality are alternated with the secondary coils of the second plurality (Column 5, lines 37-46).

29. With respect to claim 54, Heaton discloses a spin-lattice relaxation estimate based on a combination spin echo measurements from at least two of the array of coils (Column 6, lines 34-39).

30. With respect to claim 59, see rejection of claims 1-4 above.

31. With respect to claim 61, Heaton discloses the primary coil is situated between a pair of secondary coils (Figures 2-6).

*Claim Rejections - 35 USC § 103*

32. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

33. Claims 9, 19-23, 34, 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heaton et al. (US 6,255,818) in view of Taicher et al. (US 6,018,243).

With respect to claims 9 and 34, Heaton discloses the claimed invention as stated above in paragraph 9 except for the secondary RF field is orthogonal to the primary RF field.

However, Taicher discloses orthogonal RF fields (Figure 3a, #85 and #86). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Taicher's orthogonal coil structure with Heaton's NMR measurement apparatus for the purpose of reducing the dead time and improving the signal to noise ratio for any particular RF power used to generate the RF fields as shown by Taicher (Column 9, lines 8-67).

34. With respect to claims 19 and 44, Heaton discloses the claimed invention as stated above in paragraph 9 except for the secondary antenna is embedded in the primary antenna. However, Taicher discloses the secondary antenna is embedded in the primary antenna (Figure 3a, #85 and #86). Therefore, it would have been obvious to one of ordinary skill in the art at the time the



invention was made to use Taicher's coil structure with Heaton's NMR measurement apparatus for the purpose of reducing the dead time and improving the signal to noise ratio for any particular RF power used to generate the RF fields as shown by Taicher (Column 9, lines 8-67).

35. With respect to claims 20 and 45, Heaton discloses the second coil is operated in a passive mode as a receiver of signals produced in response to a transmission by the first coil (Column 5, lines 28-62).

36. With respect to claims 21 and 46, Heaton discloses the second coil is operated in an active mode as both a transmitter and a receiver (Column 5, lines 28-62).

37. With respect to claims 22 and 47, Heaton discloses the secondary antenna selectably transmits a portion of an NMR acquisition sequence (Column 5, lines 28-62).

38. With respect to claims 23 and 48, Heaton discloses the primary coil is selectably operated in either a passive or active mode (Column 5, lines 28-62).

### ***Conclusion***

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in the PTO 892 discloses NMR logging tools having RF coils with vertical resolution.

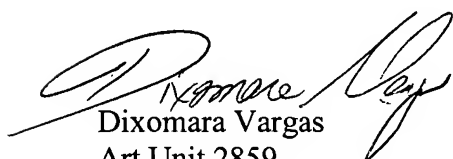
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (703) 305-5705. The examiner can normally be reached on 8:00 am. to 4:30 pm..


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.

  
Dixomara Vargas  
Art Unit 2859  
September 2, 2003

  
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